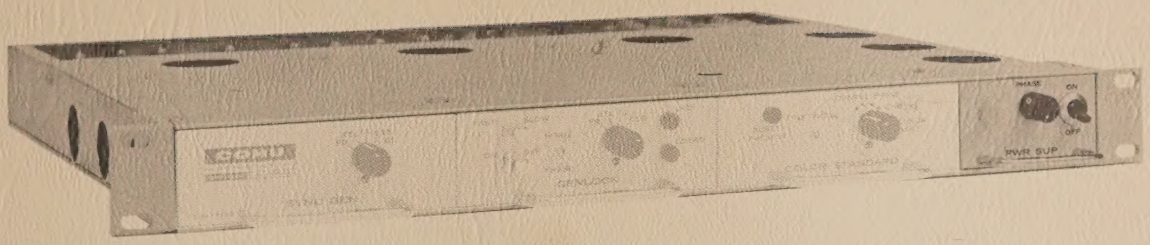
Technical Manual
Code No. 6X-427(A)



OPERATING AND MAINTENANCE
INSTRUCTIONS FOR

RACKMOUNTING SYNC GENERATOR ENCLOSURES

2470 SERIES

Box 623 / San Diego, California 92112 / Phone (714) 277-6700

COHU
ELECTRONICS, INC
SAN DIEGO DIVISION

OPERATING AND MAINTENANCE INSTRUCTIONS FOR 2470 SERIES RACKMOUNTING SYNC GENERATOR ENCLOSURES

SERIAL NUMBER EFFECTIVITY: (Ref. NOTE on "A" page)

Enclosure Assemblies	9-0061 through 9-0310
Enclosure Frame	5-0311 and HIGHER
Power Supply Assemblies	9-0061 through 9-0310
Power Supply Assemblies	4-0311 and HIGHER
Connector Panel Assemblies	5-0311 and HIGHER
Interconnection Board Assemblies	5-0311 and HIGHER

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Box 623, San Diego, California 92112

NOTE

After serial number 9-0310, mechanical configuration of the 2470 Series Enclosure was changed such that several mechanical and electrical subassemblies were assigned discrete serialized identity. Interchangeability of components is affected only to a minor degree indicated in the parts lists. Unless otherwise indicated, subassemblies are interchangeable between units 9-0061 through 9-0310 and units 5-0311 and higher.

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Section I
GENERAL DESCRIPTION

1-1. INTRODUCTION

Instructions and other data pertaining to rackmounting sync generator enclosures of the 2470 series are presented in this publication for the installation, operation and maintenance of standard units. Difference data will be appended when necessary to provide coverage for those units which incorporate changes to standard circuitry, or which otherwise involve departures from electrical, mechanical, or environmental parameters herein described.

When reordering instruction manuals, reference must be made to the serial numbers of the chassis enclosure and of all plug-in circuit assemblies, and to the publication dates and code numbers of the specific manuals. For manuals containing difference data, reference also must be made to the publication code number of the difference data section(s) which apply to the specific system.

1-2. IDENTIFICATION

Each chassis enclosure of the 2470 series is equipped with intersystem connectors, circuit-assembly interconnection board, AC-line switch and fuse, and a plug-in power supply assembly.

Front panels of installed plug-in circuit assemblies form the front panel of the enclosure. Filler panels are used to cover unoccupied compartments (Figure 1-1).

Models 2472-000 (BNC equipped) and 2473-000 (UHF equipped) are the basic standard enclosures, which are equipped with plug-in power supply. Table 1-1 identifies standard circuit assemblies by model number. Table 1-2 lists model numbers for enclosures equipped with specific circuit-assembly combinations.

The power switch on the plug-in power supply circuit assembly controls application of line power to the system.

All outputs are available at standard connectors mounted on the rear panel of the enclosure. Test jacks adjacent to the related output connectors permit checking of outputs without disconnecting system cables.

1-3. PLUG-IN CIRCUIT ASSEMBLIES

Plug-in circuit assemblies for 2470 series enclosures are listed in Table 1-1. The publication code number for each circuit-assembly instruction manual is tabulated opposite the respective assembly tabulation.

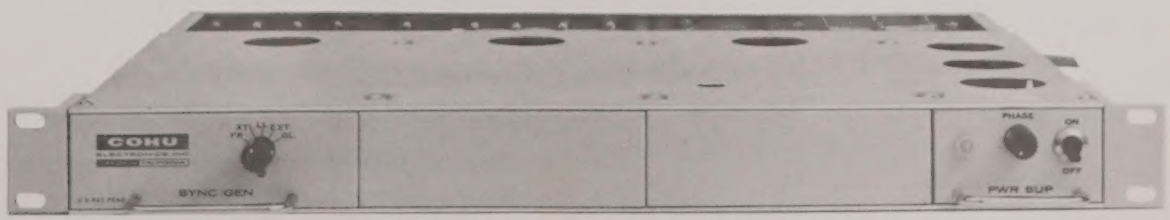


Figure 1-1. Model 2472-500 Rackmounting Sync Generator

1-4. SPECIFICATIONS

Environmental, electrical and mechanical specifications for 2470 series enclosures are given in Table 1-2. Refer also to the manuals for the plug-in circuit assemblies, as listed in Table 1-1. Figure 1-2 provides outline dimensions of the 2470 series enclosure.

Table 1-1. Instruction Manual Coverage for 2470 Series

MODEL NO.	PLUG-IN CIRCUIT ASSEMBLY	MANUAL CODE NO.
2472-000	MINIATURIZED RACKMOUNTING SYNC GENERATOR ENCLOSURE WITH POWER SUPPLY (BNC CONNECTORS)	6X-427(A)
2473-000	MINIATURIZED RACKMOUNTING SYNC GENERATOR ENCLOSURE WITH POWER SUPPLY (UHF CONNECTORS)	
2470-500	525-LINE SYNC GENERATOR	6X-423(A)
2470-011	525-LINE DOT·BAR GENERATOR	6X-425
2470-013	GENLOCK (Units 1-0016 through 1-0085)	6X-424(A)
	GENLOCK (Units 1-0086 and ON)	6X-424(B)
2470-015	COLOR STANDARD WITH COLORLOCK*	6X-426(A)
2470-200	729-LINE SYNC GENERATOR	6X-439
2470-300	873-LINE SYNC GENERATOR	6X-439
2470-400	945-LINE SYNC GENERATOR	6X-439
2470-012	945-LINE DOT·BAR GENERATOR	6X-425
2470-092 (BNC) 2470-093 (UHF)	RACKMOUNTING AUTOMATIC SYNC SYSTEM-CHANGEOVER SWITCH	6X-428(A)

*COLOR STANDARD OPERATES ONLY IN CONJUNCTION WITH GENLOCK; DOT·BAR GENERATOR AND COLOR STANDARD CANNOT BE USED IN SAME ENCLOSURE SIMULTANEOUSLY.

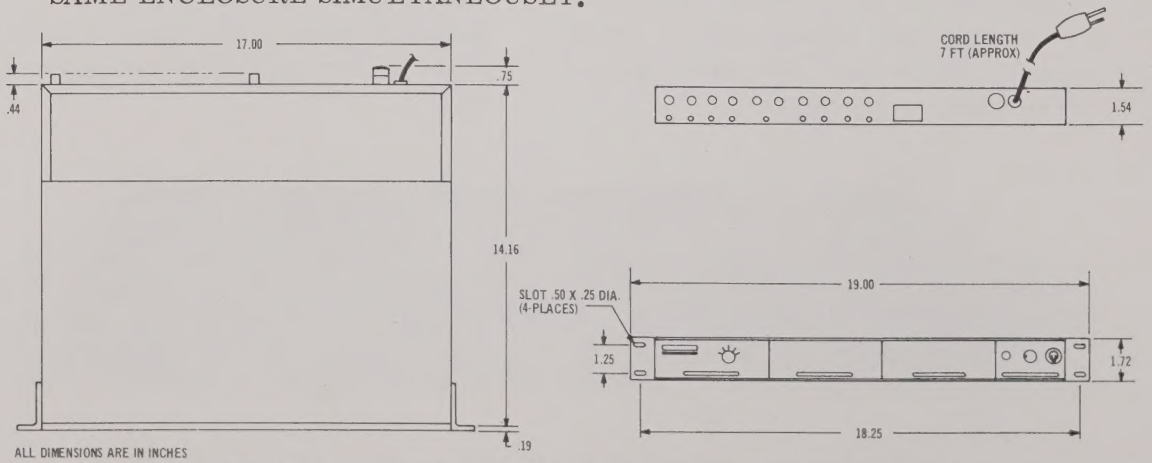


Figure 1-2. Outline Dimensions of 2470 Series Sync Generator Enclosures

Table 1-2. Specifications, 2470 Series Miniaturized Rackmounting Sync Generators and Accessories

ELECTRICAL *(Measured at 25°C)*

(All pulse outputs meet EIA Specification RS-170 and FCC and all network standards. Vertical drive and blanking times are fixed within EIA tolerances. Pulse rise times meet EIA standards.)

SYNC GENERATOR

Outputs:	Horizontal Drive, Vertical Drive, Mixed Blanking, Sync
Output Amplitude:	All outputs 4.0 volts ± 5% P-P negative into 75 ohms, source-terminated; adjustable from 3.5 to 4.5 volts
Rise and Fall Time:	All outputs 100 to 140 nanoseconds
Overshoot or Tilt:	All outputs less than 1%
Pulse Widths:	Widths of all generated pulses adjustable, except V. Blanking (21H) and V. Drive (9H). V. Drive front porch may be advanced to approximately 4 microseconds. No interaction of controls; all control-range limits chosen to prevent pulse-dropout over the entire range of each control
Master Oscillator Operation:	Free-running, locked to internal precision crystal, phase-locked to ac line, locked to external signal, locked to associated genlock
Phase Adjustment:	360-degree phase adjustment for phase-locking to 60-Hz line; (control on Power Supply)
External Input:	2.0 to 8.0 volts P-P 75-ohm termination, 15.75 or 31.5 kHz for external locking of sync generator

GENLOCK

InputRequirements:	External monochrome signal 1.0 to 1.5 volts P-P composite video, or 1.0 to 5 volts P-P sync
Input Impedance:	Greater than 7.5 kilohms for bridging
Operating Modes:	LOCKED to a remotely generated sync or composite video signal; UNLOCKED operation reverts to mode selected by front-panel control (free-running, crystal-locked, line-locked, colorlocked). In the line-lock mode a 2-second delay is introduced to prevent "hunting" during a momentary interruption of the signal
Locking Speeds:	FAST-LOCK, 1/30 second maximum; SLOW-LOCK, bidirectional; adjustable from 1 second to 2 seconds maximum
Horizontal Phase:	Adjustable ± 3 microseconds

COLOR STANDARD WITH COLORLOCK

COLOR STANDARD

Color Subcarrier Frequency:	3.579545 MHz ± 10 Hz
Temperature Range:	0°C to +45°C (+32°F to +113°F)
Subcarrier Outputs:	Two outputs, each 2 volts P-P into 75 ohms, source terminated
Burst-Flag Outputs:	4 volts P-P negative into 75 ohms
Locking Pulse Output:	(To associated sync generator and genlock) 1/227.5 of color subcarrier frequency
Recalibration Interval:	Six months minimum

COLORLOCK

Operation:	Locks associated sync generator and genlock to an external NTSC composite video signal, when colorlock switch is in the ON position. Panel lamp indicates presence of color burst on incoming signal. Upon loss of burst, reverts to internal standard
Input Requirements:	1 volt P-P composite; color subcarrier component 0.28 volt ± 20%
Phase Jitter:	Less than 1 degree
Phase Adjustment:	360-degree range of front-panel control permits adjustment of phase relationship between external and local signal

DOT-BAR GENERATOR

Outputs:	Four Modes: Switch-selectable output patterns of dots, horizontal or vertical bars, and grating (crosshatch) in either polarity (black or white); phase and width of pattern components adjustable by variable controls; patterns conform to RETMA linearity test chart

FRONT PANEL CONTROLS

(SEE ILLUSTRATIONS IN RESPECTIVE MANUALS)

POWER REQUIREMENTS

2472-523 System:	105-125 volts, 60 Hz, 22 VA maximum

Table 1-2. Specifications, 2470 Series Miniaturized Rackmounting Sync Generators and Accessories (Contd)

ENVIRONMENTAL

Ambient Operating Temperature: -20°C to +55°C (-4°F to +131°F)

Humidity: Up to 95%

MECHANICAL

Circuit Construction: All solid-state; components of plug-in assemblies mounted on etched circuit boards which plug into connectors on interconnection board within the enclosure (integrated circuit components used in sync, genlock, dot-bar, and color standard assemblies)

Enclosure Input and Output Connectors: Standard BNC type (2472 series) or UHF (2473 series)

Enclosure Dimensions: (SEE FIGURE 1-2)

Weights: Single rackmounting enclosure with full complement of circuit assemblies 10¼ lbs net; 17 lbs shipped

ACCESSORY CHANGEOVER SWITCH

Dual Inputs:

H. DRIVE
V. DRIVE
MIXED BLANKING
SYNC
BURST FLAG/
DOT-BAR
} All 3.5 to 4.5 volts P-P negative

Burst Flag, 4 volts P-P negative; Dot-Bar, 1 volt composite video

SUBCARRIER "A" 3.579545 MHz, 2 volts P-P

SUBCARRIER "B" 3.579545 MHz, 2 volts P-P

(ISOLATION BETWEEN INPUTS > 40 dB)

Power Requirements: 105-125 volts, 60 Hz, <6 VA

Weights: Changeover switch in rackmounting enclosure 7-¼ lbs net; 14-½ lbs shipped

MODEL NUMBERS OF TYPICAL 2470 SERIES INSTALLATIONS

2472-500 525-LINE SYNC GENERATOR	2472-200 729-LINE SYNC GENERATOR
2472-511 525-LINE SYNC GENERATOR AND 525-LINE DOT-BAR GENERATOR	2472-300 873-LINE SYNC GENERATOR
2472-513 525-LINE SYNC GENERATOR AND GENLOCK	2472-400 945-LINE SYNC GENERATOR
2472-521 525-LINE SYNC GENERATOR, GENLOCK, AND 525-LINE DOT-BAR GENERATOR	2472-412 945-LINE SYNC GENERATOR AND 945-LINE DOT-BAR GENERATOR
2472-523 525-LINE SYNC GENERATOR, GENLOCK, AND COLOR STD WITH COLORLOCK*	2470-092 RACKMOUNTING AUTOMATIC SYNC SYSTEM — CHANGEOVER SWITCH

NOTE: All 2472 model numbers include rackmounting enclosure with plug-in power supply. Spaces not occupied by plug-in assemblies are equipped with filler panels. *Color standard operates only in conjunction with genlock; dot-bar generator and color standard cannot be used in same enclosure simultaneously.

Section II
INSTALLATION AND OPERATION

2-1. GENERAL

Instructions given here apply to standard systems which conform to the parameters described in this publication. If special instructions are mandatory for a non-standard system, these will be appended as required.

2-2. RECEIVING INSPECTION

Immediately upon receipt of equipment, inspection should be made to reveal any visible or functional damage which may have occurred in shipment. (See Form P-293-5-62-5M enclosed in the packing container.) Operational testing must be performed to ascertain whether concealed functional damage has been incurred in transit.

2-3. OPERATIONAL TEST

Operational testing of the sync system incorporating 2470 series enclosures is performed by installing the associated plug-in circuit assemblies in the enclosure, connecting the enclosure inputs and outputs to the related television system and operating the system. Alternatively, tests may be made by measuring the output pulses. The outputs should correspond to the respective illustrations in the instruction manuals for the specific plug-in circuit assemblies.

(NOTE WARNING ON PAGE 2-2)

2-4. WARRANTY

Standard warranty certificate, Form No. S-212 (an integral part of this manual), applies to 2470 Series Rackmounting Sync Generator Enclosures. Instructions and conditions stated or implied in this manual are not to be interpreted in any manner which would conflict with or modify the meaning or intent of the enclosed warranty.

2-5. INSTALLATION

2470 series enclosures are designed to be installed in standard 19-inch racks or cabinets. Four rack-attaching screws — two at each side — secure the enclosure in place. The rack area must have adequate air-circulation clearance to comply with operating temperature specifications.

Check all plug-in circuit assemblies to be certain that each is properly inserted and making connection with the circuit interconnection board terminals. Note that the color standard must be unplugged to accommodate the dot-bar generator. (See Figures 2-1 and 2-2.)

Connect the AC power cord to a source of 115 ±10 volts, 60 Hz. Connect the pulse-output connectors to the proper television system cables. If genlock is used, connect video or sync source to loop-through input J5/J6. For standard units, cable must be 75-ohm coaxial cable with proper connectors. For remote connections to J21, refer to 2-7.

2-6. OPERATION

The AC ON-OFF switch of the plug-in power supply provides control of line power to the power supply. After operating mode is selected (according to operating instructions for the plug-in circuit as-

semblies), only a change in mode, switching between generators, and operating the master power switch will be required for normal operation.

AC line phasing may be adjusted over a 375° range by resetting of R10 in the power supply, thus permitting phasing of an installed generator to external devices such as film projectors.

Refer also to the operating instructions for the specific plug-in circuit assemblies installed in the enclosure.

2-7. REMOTE CONTROLS

Connections are provided for remote control and indication of certain system functions. (See J21 connections and details in the appropriate schematic diagrams.) Provisions are made only for these specific remote functions. Remote switches and indicator lamps used with this system should be rated equivalent to those of the local switches and lamps used in the respective plug-in circuit assemblies.

WARNING

DO NOT SET SYNC MODE SWITCH IN "GL" POSITION WITH CAMERA CHAIN CONNECTED TO SYNC GENERATOR UNTIL CERTAIN THAT GENLOCK PLUG-IN IS PROPERLY INSTALLED. WITH SYNC SET FOR "GL" OPERATION AND WITHOUT POSITIVE PROPER CONNECTION OF GENLOCK PLUG-IN, THERE WILL BE NO VERTICAL OUTPUT SIGNALS, WITH POSSIBLE RESULTANT DAMAGE TO A CONNECTED OPERATING CAMERA SYSTEM.

IN SYSTEMS INCORPORATING GENLOCK, BE CERTAIN THAT EITHER "LKD" OR "UNLKD" LAMP IS LIGHTED BEFORE CONNECTING CAMERA CHAIN TO SYNC GENERATOR OUTPUTS AND OPERATING CAMERA SYSTEM.

2-8. CHANGEOVER SWITCHING

When a Model 2470-092 Changeover Switch is connected between two sync systems in 2470 series enclosures, the switch selects connections to provide all system outputs from one system. Preselected switch setting determines which system is in use; remote or local manual switching effects complete changeover to utilize the outputs of the standby system. With changeover preset for automatic switching, failure of any of the four sync assembly outputs automatically effects complete system changeover.

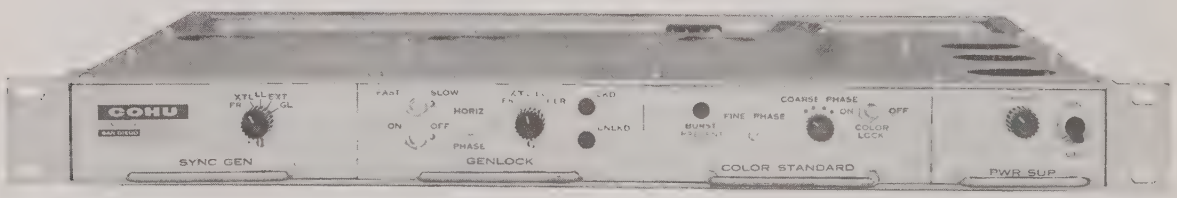


Figure 2-1. Model 2472-523 Rackmounting Sync Generator with Genlock and Color Standard

(NOTE: Plug-In assemblies are keyed to specific positions shown; Dot.Bar and Color Standard use same position)

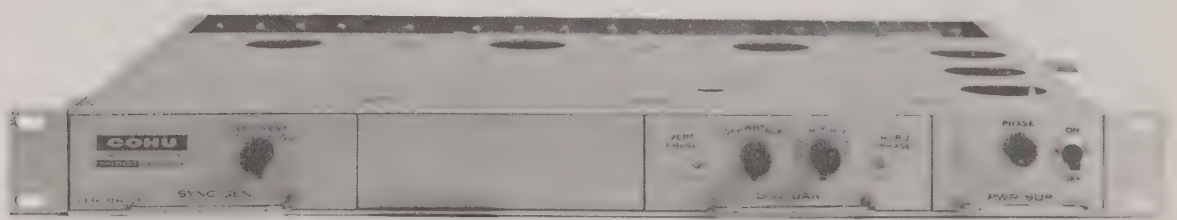


Figure 2-2. Model 2472-511 Rackmounting Sync Generator with Dot•Bar Generator

Section III
CIRCUIT DESCRIPTION

3-1. GENERAL

2470 series enclosures provide mounting facilities and circuit interconnections for installed plug-in circuit assemblies, and input and output connections for the complete sync-and-accessory system. The plug-in power supply circuit assembly which, in conjunction with enclosure circuitry, furnishes operating power for the other plug-in circuit assemblies, is considered a component part of the enclosure. Therefore, circuit details are given here for the enclosure and power supply. Circuit details for all other plug-in assemblies are provided in the respective assembly instruction manuals (reference Table 1-1).

3-2. SCHEMATIC DIAGRAMS

Schematic diagrams of the enclosure circuitry are shown in Figures 3-1 through 3-3. Power Supply circuits are schematically illustrated in Figures 3-4 through 3-6. Use of the schematic diagrams in the manuals for the associated circuit assemblies (ref. Table 1-1) will facilitate the study of system operation.

3-3. POWER CIRCUITS

Secondary windings of line transformer T1 (and T2 in early units) furnish all ac power for the rectifiers in the enclosure and power supply assembly.

3-4. RELAY AND PILOT-LAMP SUPPLY

Full-wave rectifier CR1, CR2 on the circuit interconnection board of the enclosure provides +28 volts maximum (limited by series regulator Q1, CR3) for the relays and pilot lamps of the system.

3-5. REGULATED +3.6-VOLT SUPPLY

A series regulator furnishes +3.6 volts for the integrated-circuit components of the sync and accessory assemblies.

A reference voltage set by CR9 is applied to the base of reference amplifier Q4. If regulator output tends to increase, the resultant increase of current through Q4 drives the control stage (a Darlington pair comprising Q5 in the power supply assembly and Q1 on the rear enclosure panel) toward its emitter potential, whereupon conduction decreases and the voltage drop across the stage increases, decreasing regulator output by an amount proportionate to the difference signal, returning output to normal. A decrease in regulator output similarly causes an increase in conduction of the control stage to return output to normal.

The reference voltage level is set by R19 in the reference-divider shunt. Circuit-breaker CB1 protects this low-voltage regulator in the event of heavy surges in the AC line powering the system.

3-6. REGULATED +20-VOLT SUPPLY

A sample of this regulator-circuit output is applied as base bias to Q7, part of the differential amplifier used as the reference amplifier in the regulator. Bias level at normal output is set by voltage divider R21, R22, R23 and adjusted by setting of R22. A reference voltage set by CR8 is applied to the base of Q6 in the differential amplifier. If regulator circuit output tends to increase, the consequent base-emitter voltage change decreases Q6 collector cur-

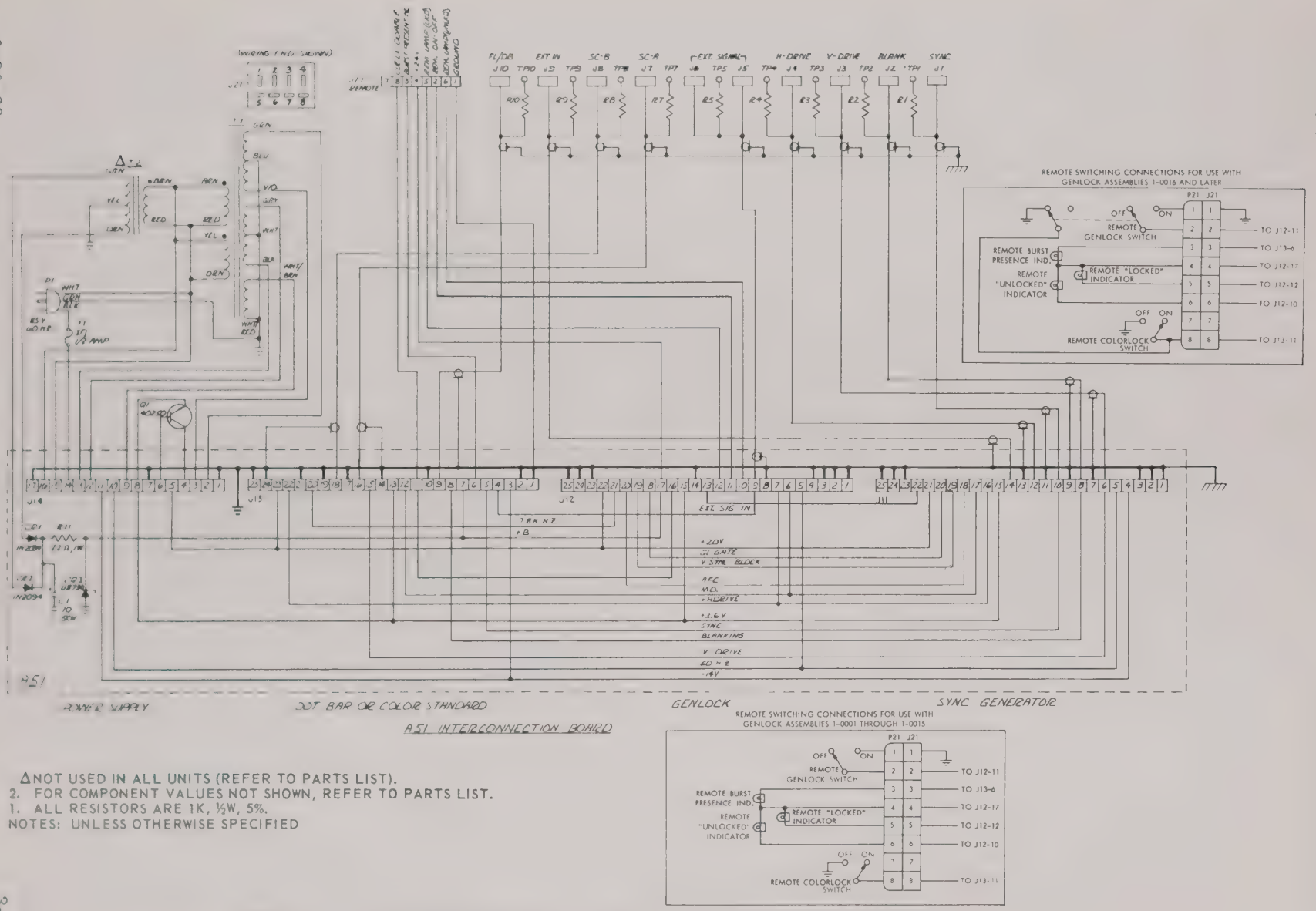
rent. The voltage change across collector-load resistor R3 appears at the base of dc amplifier Q3, which increases current level sufficiently to drive control stage Q2. As Q2 base is driven toward its emitter potential, conduction decreases and voltage drop across the stage increases, returning regulator output to normal. Similar but opposite compensation returns output to normal if it has a tendency to decrease.

3-7. REGULATED -14-VOLT SUPPLY

Full-wave rectifier CR4, CR6 provides a negative output which is regulated by Zener diode CR3 and current amplifier Q1. This is the -14-volt supply of the system.

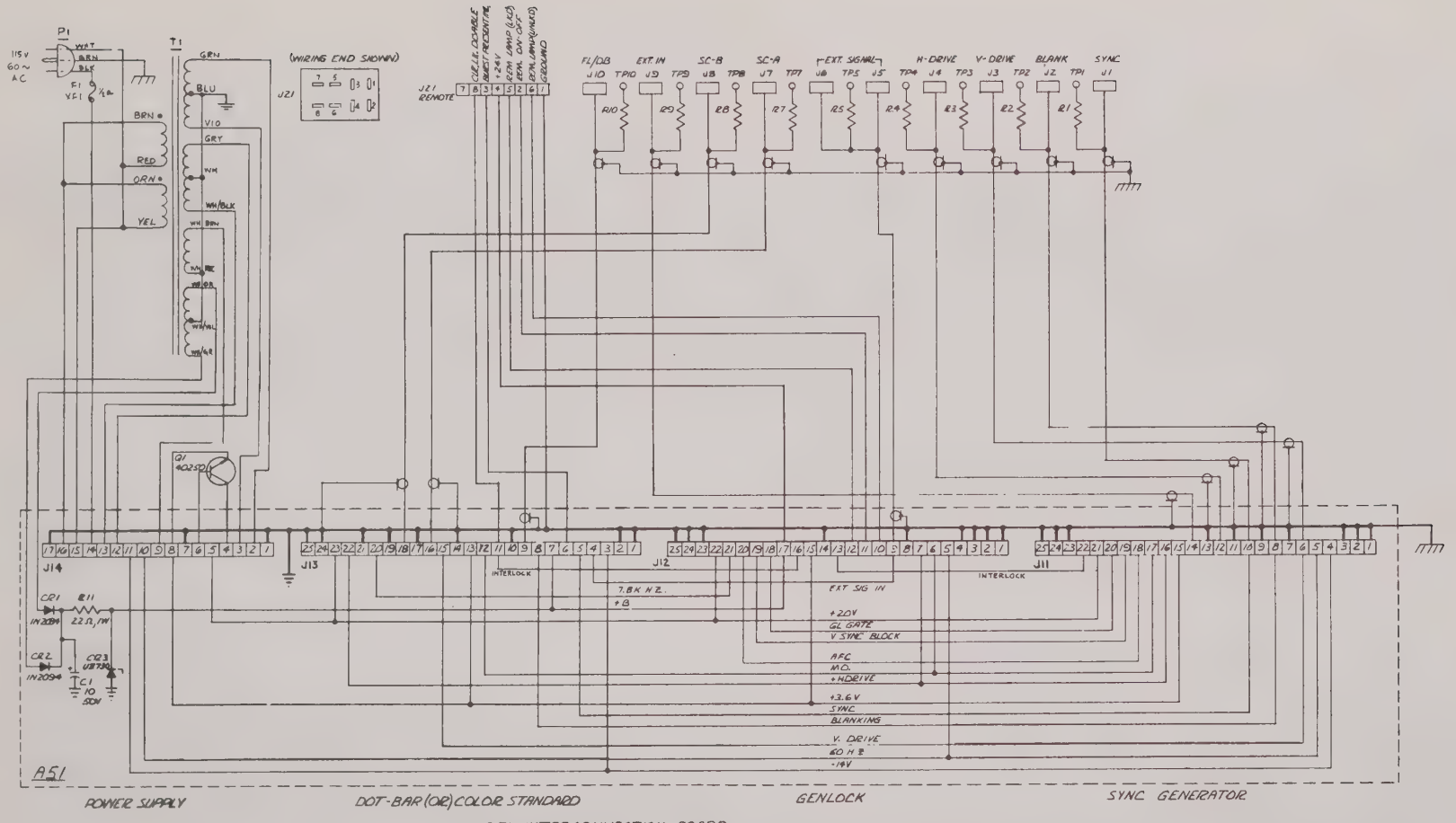
3-8. PHASE CONTROL

Stages Q8, Q9, and Q10 provide balanced drive to the series phase-shifter RC networks. The emitter-collector RC network of each stage includes a variable resistance (R10A, B, C) which permits phase adjustment of the stage. The combined phase-variation range of the three stages is approximately 370 degrees. Emitter follower Q11 presents a high impedance to the phase inverter output, and a lower impedance to clipper Q12. The clipped signal at Q12 collector is the 60-Hz reference for Sync and Genlock circuits.



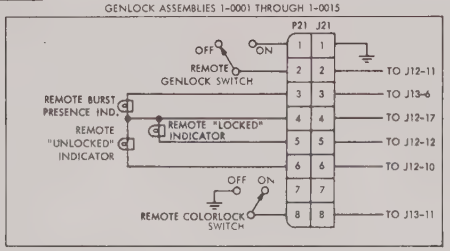
ΔNOT USED IN ALL UNITS (REFER TO PARTS LIST).
2. FOR COMPONENT VALUES NOT SHOWN, REFER TO PARTS LIST.
1. ALL RESISTORS ARE 1K, ½W, 5%.
NOTES: UNLESS OTHERWISE SPECIFIED

Figure 3-1. Schematic Diagram, 2472-000 Rackmounting Sync Generator Enclosure, Units 9-0061 through 9-0085 (Ref. Dwg. No. D8416930D)

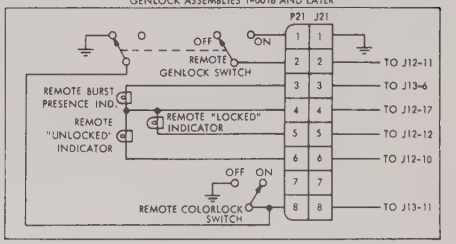


A51 INTERCONNECTION BOARD

REMOTE SWITCHING CONNECTIONS FOR USE WITH GENLOCK ASSEMBLIES 1-0001 THROUGH 1-0015

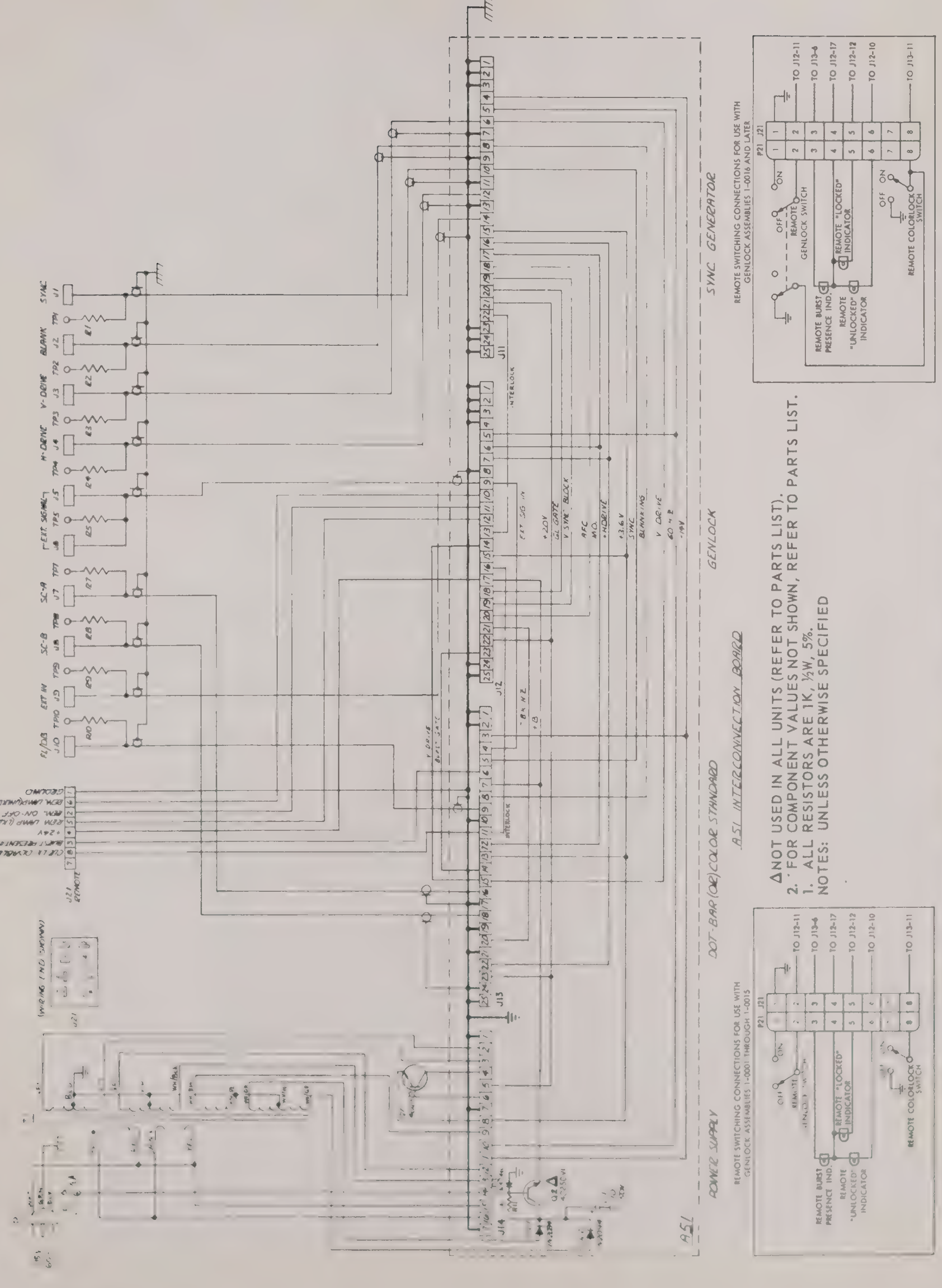


REMOTE SWITCHING CONNECTIONS FOR USE WITH GENLOCK ASSEMBLIES 1-0016 AND LATER



2. FOR COMPONENT VALUES NOT SHOWN, REFER TO PARTS LIST.
1. ALL RESISTORS ARE 1K, ½W, 5%.
NOTES: UNLESS OTHERWISE SPECIFIED

Figure 3-2. Schematic Diagram, 2472-000 Rackmounting Sync Generator Enclosure, Units 9-0086 through 9-0210 (Ref. Dwg. No. D8423902A)


SYNC J1
TP1
BLANK J2
TP2
V-DRIVE J3
TP3
H-DRIVE J4
TP4
EXT. SIGNAL J5
TP5
J6
SC-A J7
TP7
SC-B J8
TP8
EXT IN J9
TP9
FL/DB J10
TP10
R1
R2
R3
R4
R5
R7
R8
R9
R10
J21 REMOTE
GROUND
+24V
J11
J12
J13
J14
INTERLOCK
EXT SIG IN
+20V
V DRIVE
AFC
M.O.
+H DRIVE
+3.6V
SYNC
BLANKING
V DRIVE
60 H Z
-19V
+B
Q2
SYNC GENERATOR
GENLOCK
DOT-BAR(OR)COLOR STANDARD
POWER SUPPLY
A51 INTERCONNECTION BOARD
A51
REMOTE SWITCHING CONNECTIONS FOR USE WITH GENLOCK ASSEMBLIES 1-0016 AND LATER
REMOTE SWITCHING CONNECTIONS FOR USE WITH GENLOCK ASSEMBLIES 1-0001 THROUGH 1-0015
P21
J21
OFF
ON
REMOTE GENLOCK SWITCH
REMOTE "LOCKED" INDICATOR
REMOTE BURST PRESENCE IND.
REMOTE "UNLOCKED" INDICATOR
REMOTE COLORLOCK SWITCH
TO J12-11
TO J13-6
TO J12-17
TO J12-12
TO J12-10
TO J13-11

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE 1K, ½W, 5%.
2. FOR COMPONENT VALUES NOT SHOWN, REFER TO PARTS LIST.

Δ NOT USED IN ALL UNITS (REFER TO PARTS LIST).

Figure 3-3. Schematic Diagram, 2472-000 Rackmounting Sync Generator Enclosure, Units 9-0211 through 9-0310 (Ref. Dwg. No. D8423902C)

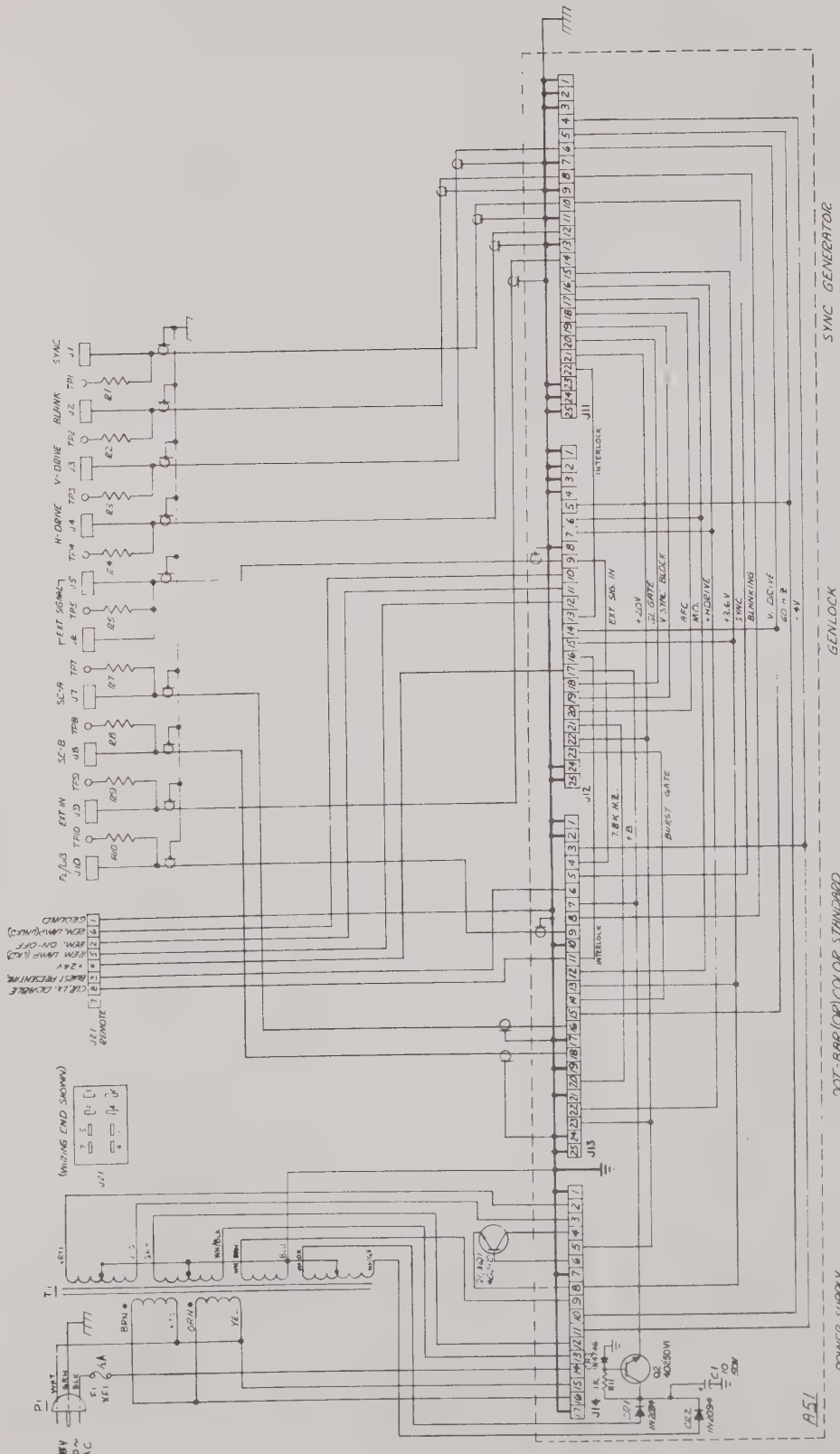


Figure 3-4. Schematic Diagram 2472-000 and 2473-000 Rackmounting Sync Generator Enclosure, Units 5-0311 and ON (Ref. Dwg. No. D8441500)

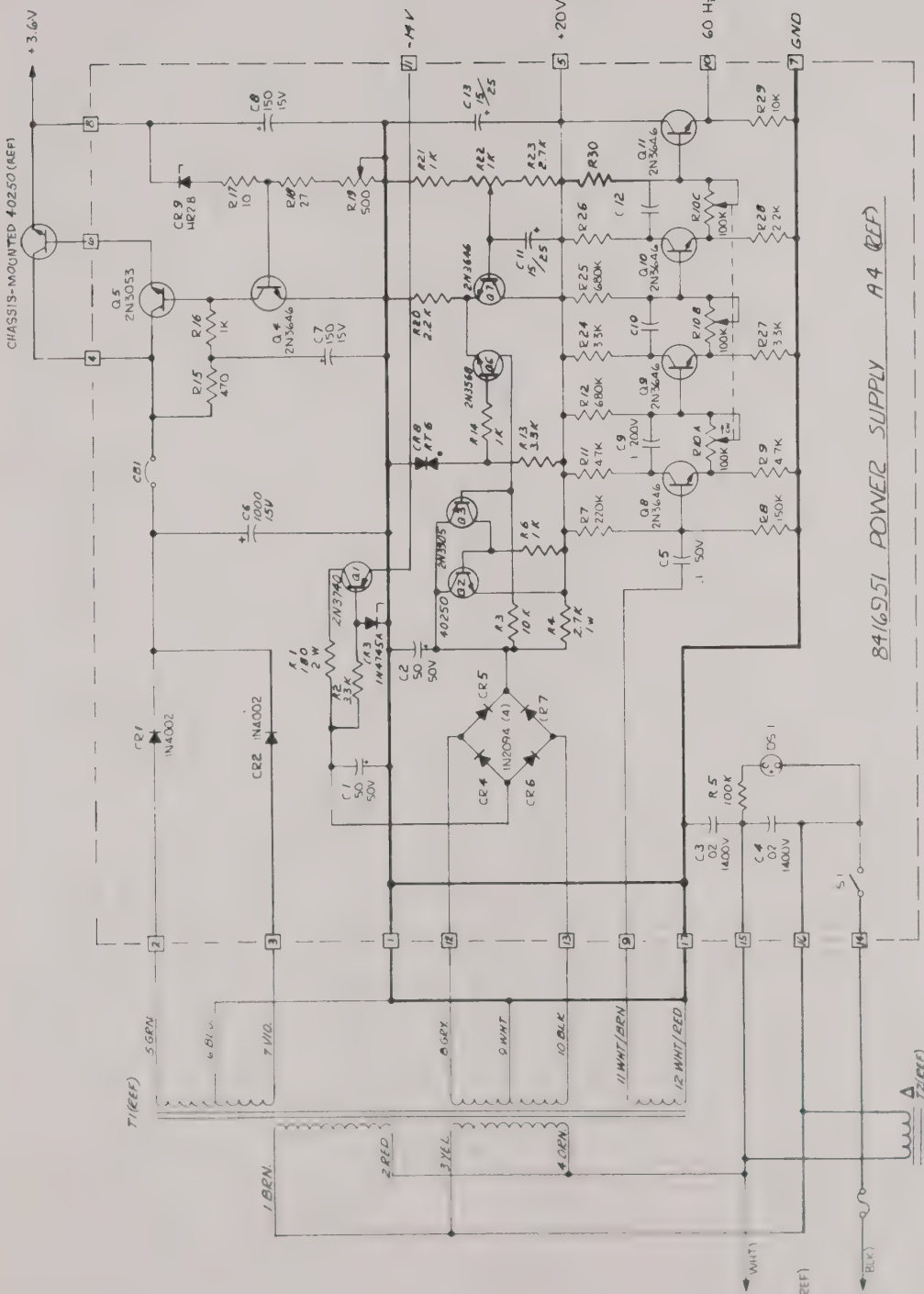


Figure 3-5. Schematic Diagram, Plug-In Power Supply Circuit Assembly for Model 2472-000 Rackmounting Sync Generator Enclosure Units 9-0061 through 9-0085 (Ref. Dwg. No. D8416950B)

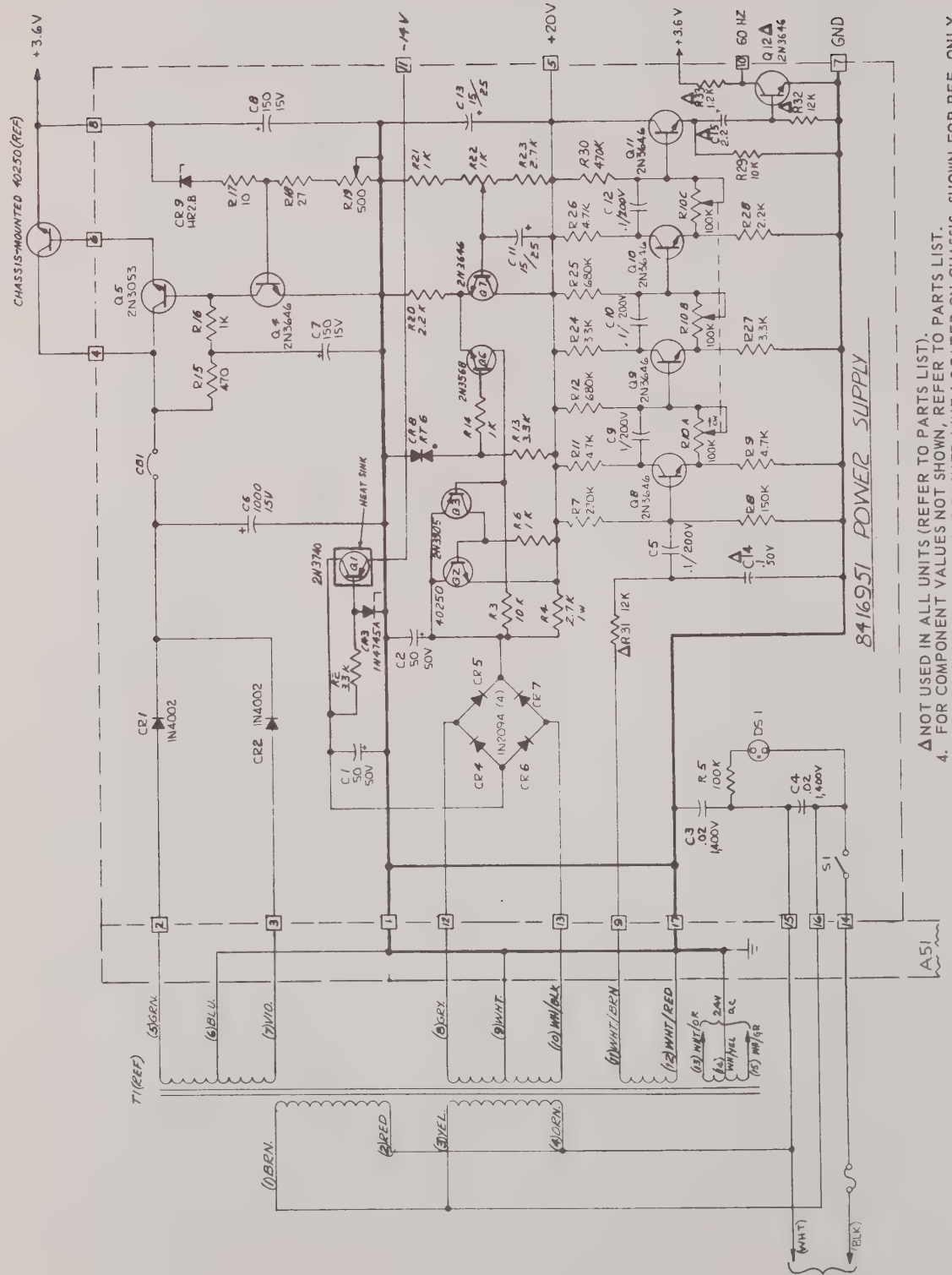
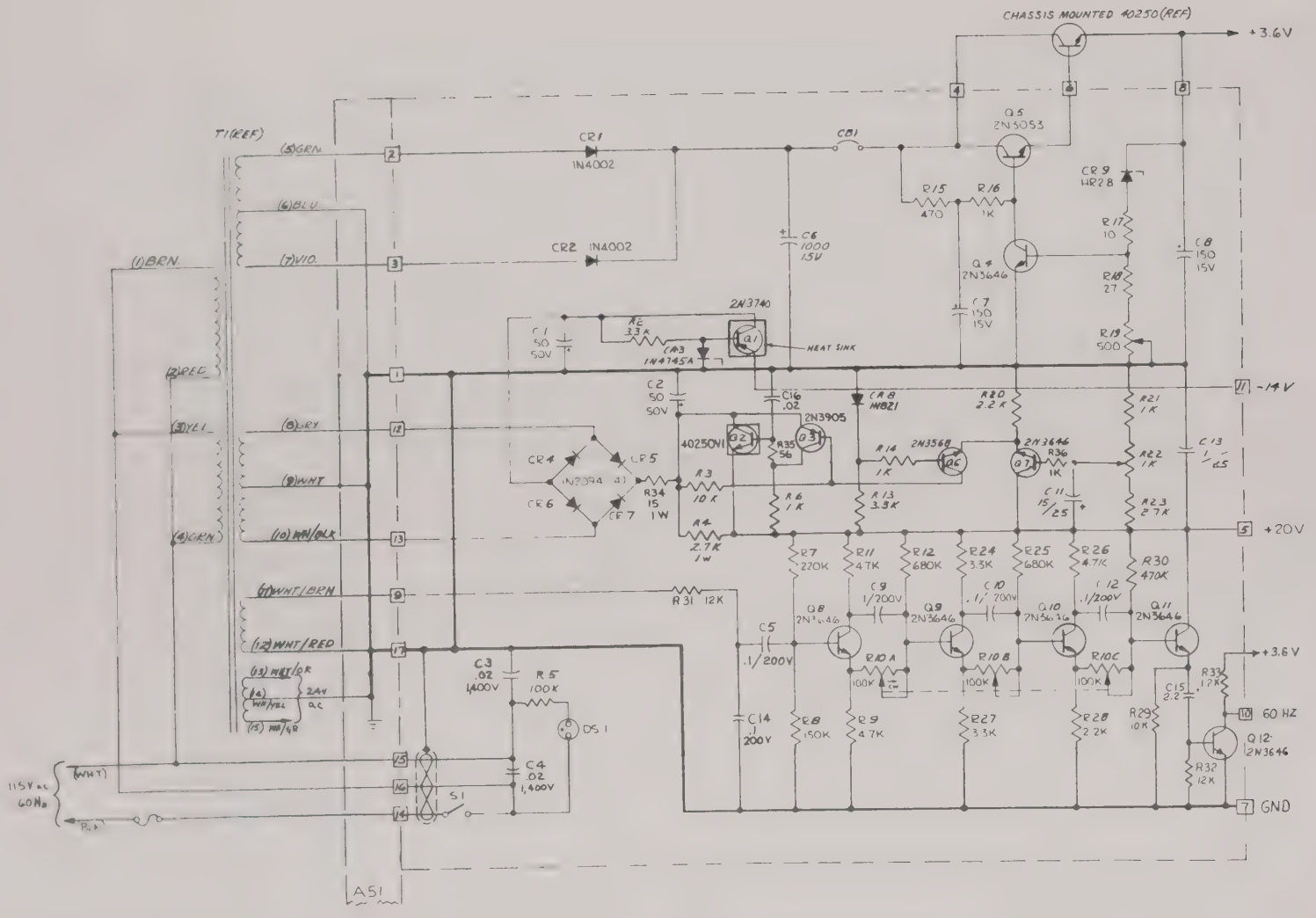


Figure 3-6. Schematic Diagram, Plug-In Power Supply Circuit Assembly for Model 2472-000 Rackmounting Sync Generator Enclosure, Units 9-0086 through 9-0210 (Ref. Dwg. No. D8423950A)



3 CIRCUITRY SHOWN OUTSIDE DASHED LINE IS LOCATED ON CHASSIS, SHOWN HERE FOR REF ONLY.
2 CAPACITOR VALUES ARE IN UF.
1 RESISTORS ARE 1/4W, VALUES ARE IN OHMS ± 5%
NOTES: UNLESS OTHERWISE SPECIFIED

Figure 3-7. Schematic Diagram, Plug-In Power Supply Circuit Assembly for Model 2472-000, Units 9-0211 through 9-0310, and for Models 2472-000 and 2473-000, Units 5-0311 and Higher (Ref. Dwg. No. D8423960)

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Section IV
MAINTENANCE

4-1. GENERAL

Maintenance procedures for 2470 series enclosures consist of normal preventive maintenance through periodic cleaning and checking, and corrective maintenance as required. Circuit checks of plug-in assemblies are facilitated by use of plug-in service extension boards. To use extension boards, remove the assembly to be checked and insert the proper extension board in its place, making certain that the terminals are tightly in contact; connect the removed assembly to the terminals of the extension board (Figure 4-1). The assembly connections thus made are the same as when the plug-in is normally installed in the chassis enclosure. For units 9-0061 through 9-0310, extension board for sync and accessory modules is shipped with the enclosure, but the power supply extension board (refer to Table 4-1 for COHU Part No.) is a separately purchased item. For units 5-0311 and later, both extension boards are furnished.

4-2. PREVENTIVE MAINTENANCE

Periodic cleaning and inspection should be scheduled as required to minimize accumulation of dust, lint, and other airborne matter which might be detrimental to operation.

4-3. CONTROL ADJUSTMENTS VERSUS COMPONENT CHANGES

Power supply adjustment details are given under 4-6, 4-7, and 4-8 as a part of the testing procedures. Such adjustments also may be considered as a part of preventive maintenance in those cases where component values have changed with age and may cause a slight deviation from normal output. Adjustment during preventive maintenance checks may preclude the necessity of scheduling corrective maintenance at a somewhat later date, avoiding down time.

4-4. CORRECTIVE MAINTENANCE

Procedures for testing and troubleshooting the plug-in sync and accessory assemblies are given in the associated manuals for those plug-ins. Data is provided here for servicing only the chassis enclosure and power supply assemblies. Figure 4-2 illustrates locations of power supply controls and other components.

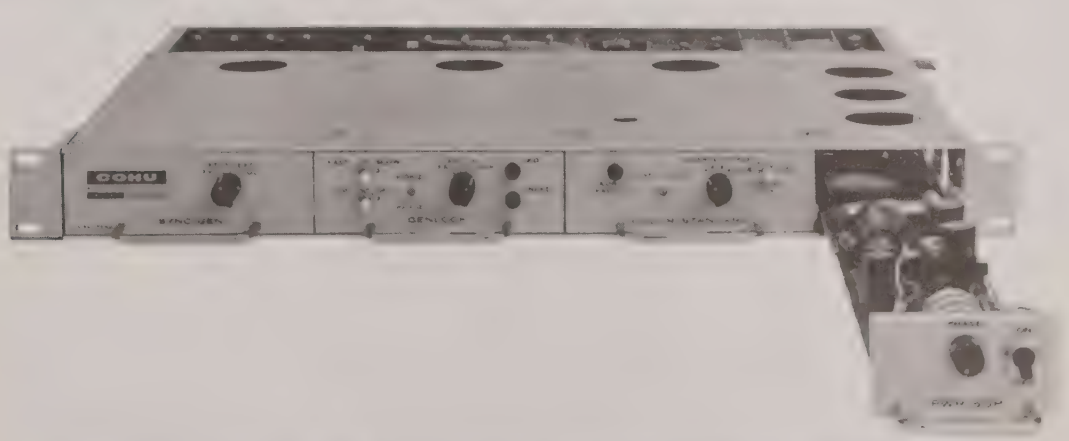
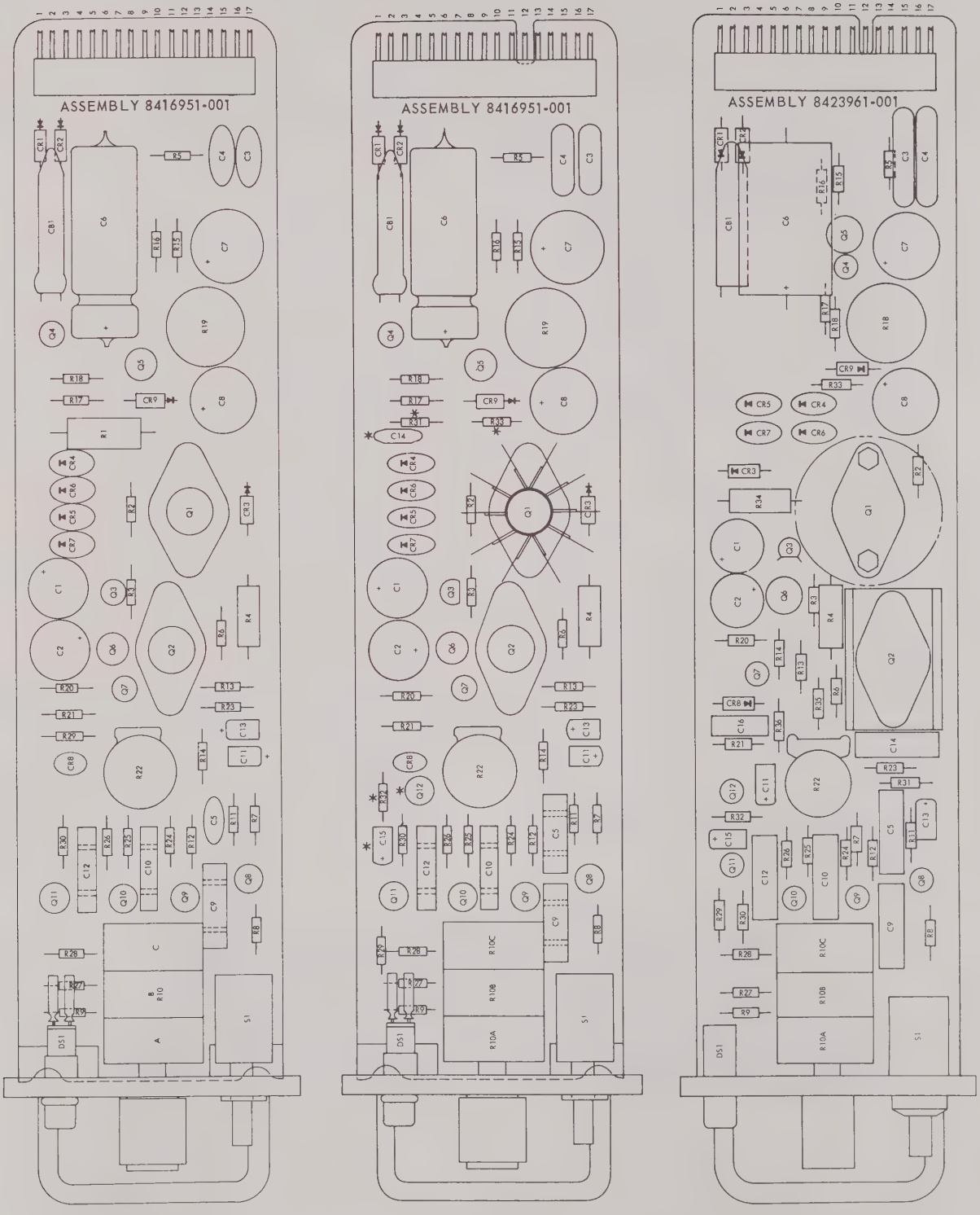


Figure 4-1. Typical 2470 Series System, Showing Power Supply Assembly Installed on Extension Board



(a) Units 9-0061 through 9-0085

(b) Units 9-0086 through 9-0210

(c) Units 9-0211 and ON

Figure 4-2. Plug-In Power Supply Assembly, Showing Control and Component Locations

4-5. TESTING

For checking voltages in the power supply and chassis enclosure, the voltmeter recommended in the manuals for the plug-ins may be used. For simple continuity checks of wiring and switching within the enclosure, any good ohmmeter is adequate.

4-6. CHECKING +20-VOLT SUPPLY. The level at pin [5] of the power supply assembly should be +20 ±1.0 volts. This voltage should remain stable, unless circuit component values change significantly.

4-7. CHECKING -14-VOLT SUPPLY. Check the output at power supply assembly pin [11]. Adjust R706 as required to obtain -15 ±1.5 volts. This should be trimmed to provide proper p-p pulse-output voltages (4 volts p-p nominal).

4-8. CHECKING +3.74-VOLT SUPPLY. The output at power supply pin [8] should measure $+3.6\ ^{+0}_{-0}.1$ volts. R19 is adjusted to reset the level of this output.

4-9. MISCELLANEOUS SUPPORT DATA

Figures 4-3 and 4-5 show the rear connector panel of the chassis. The test jacks mounted adjacent to the output connectors facilitate checking of output waveforms without disconnecting cables. The proper waveforms for the respective scanning patterns available are illustrated in the sync assembly instruction manual. Figures 4-4 and 4-6 illustrate components inside the chassis enclosure.

4-10. REPLACEMENT PARTS

Table 4-1 lists replacement parts for the chassis enclosure. Components of the plug-in power supply assembly are listed in Table 4-2. Components of other plug-in assemblies are tabulated in the manuals for the specific assemblies (ref. 1-3.).

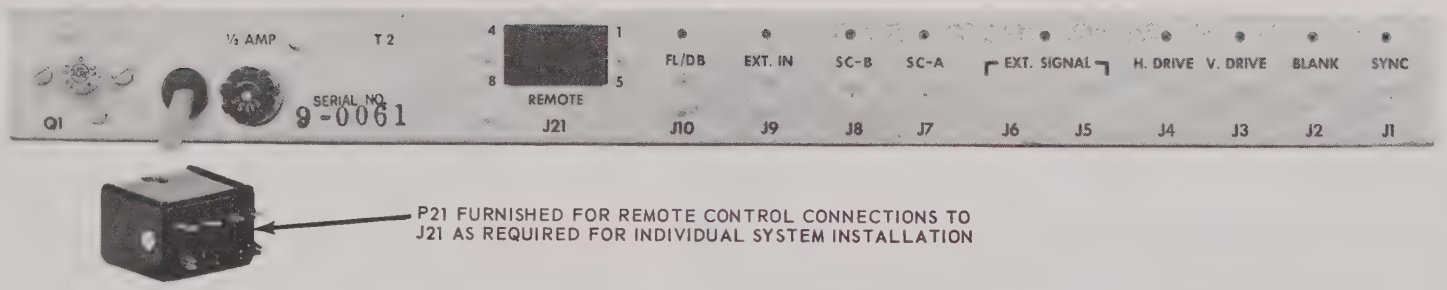


Figure 4-3. Rear Connector Panel, 2472-000 Sync Generator Enclosure (Units 9-0061 through 9-0085)

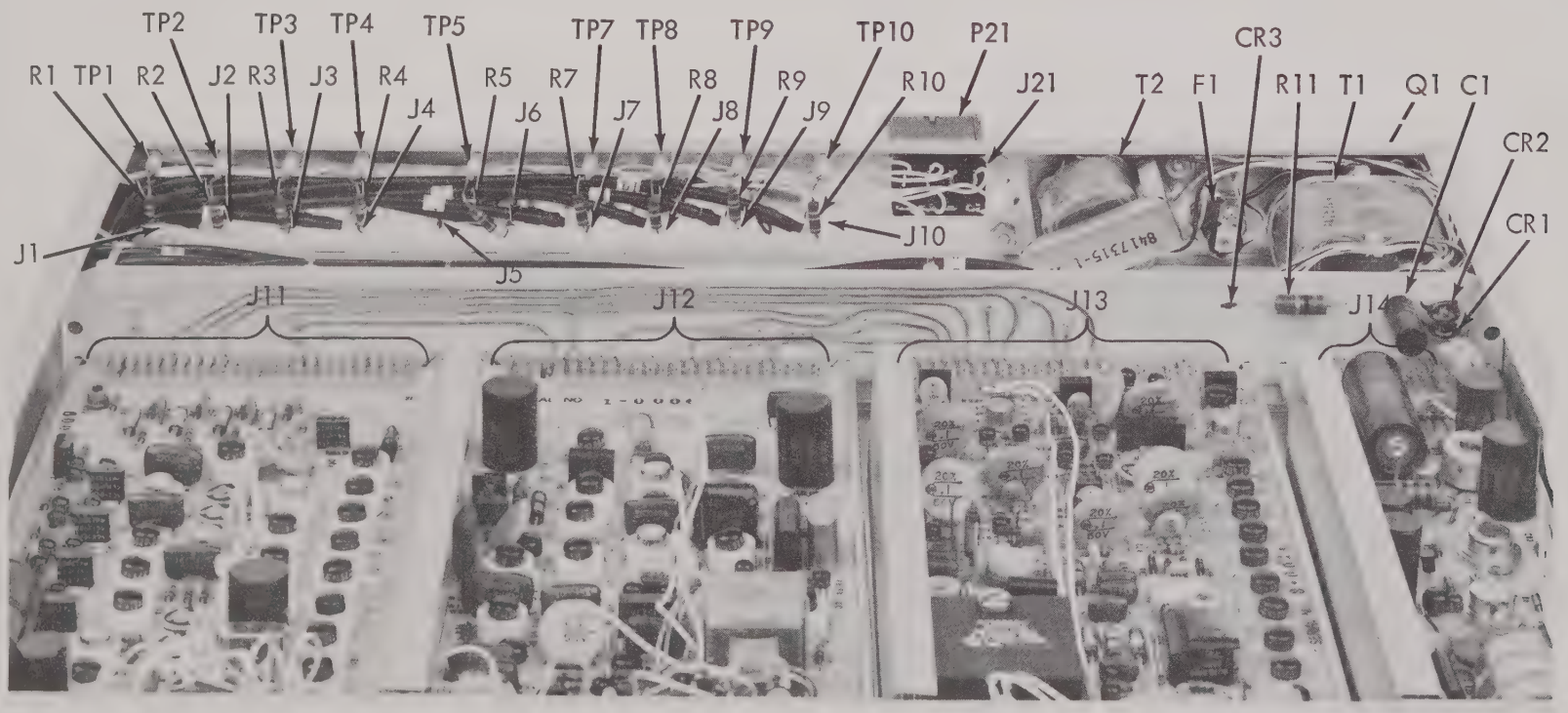


Figure 4-4. Enclosure Interior, Showing Locations of Chassis-Mounted Components (Units 9-0061 through 9-0085)

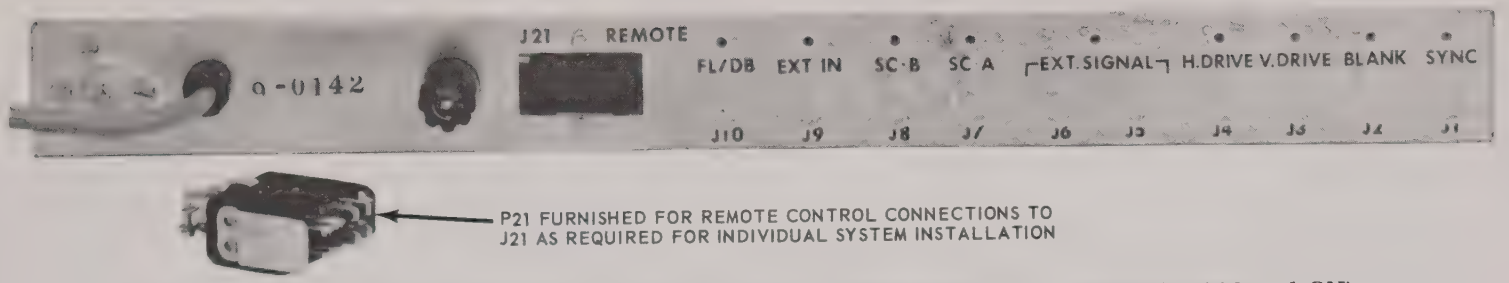


Figure 4-5. Rear Connector Panel, 2472-000 Sync Generator Enclosure (Units 9-0086 and ON)

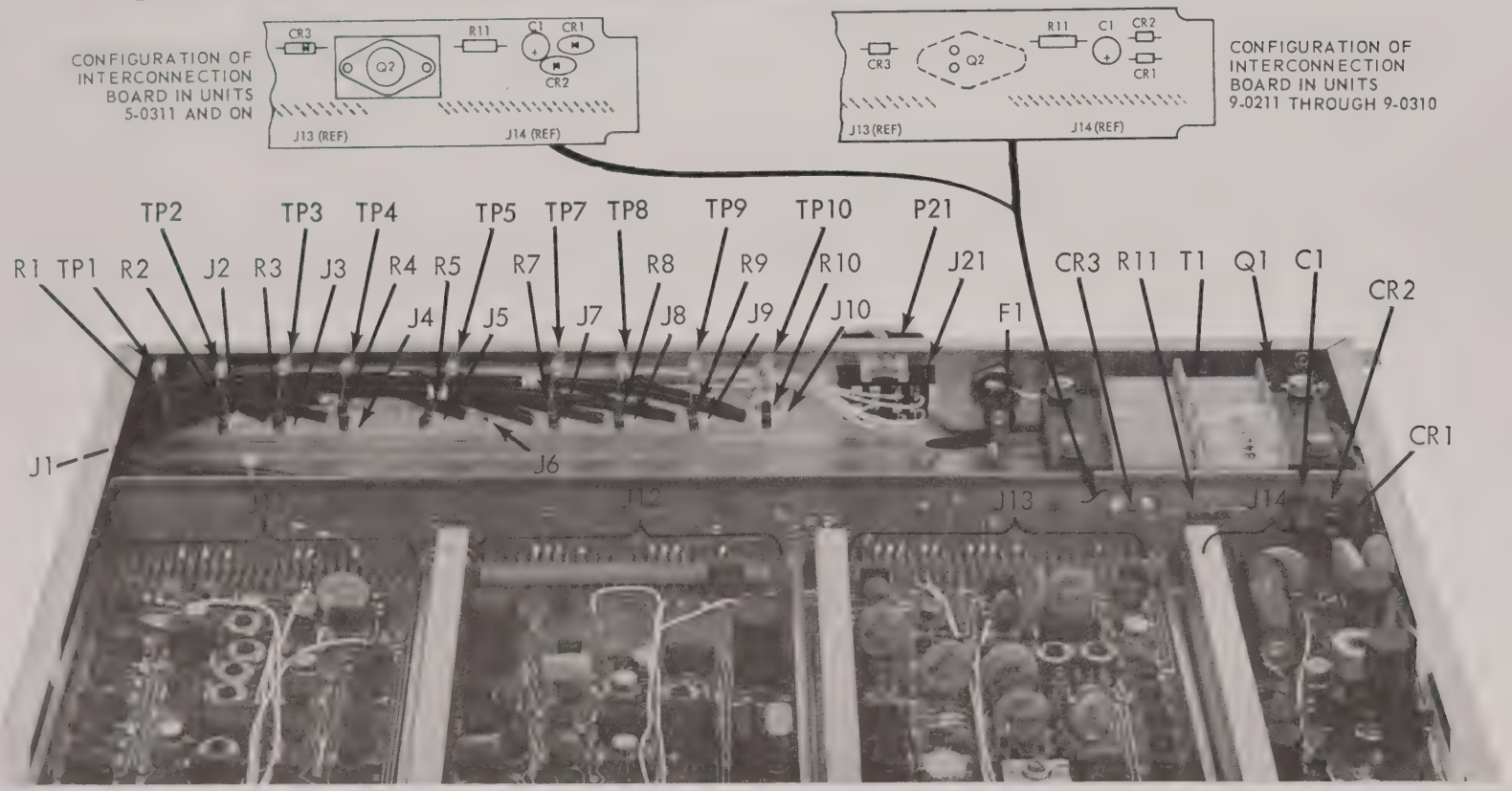


Figure 4-6. Enclosure Interior, Showing Locations of Chassis-Mounted Components (Units 9-0086 through 9-0310 and 5-0311 and Higher)

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Table 4-1. List of Replacement Parts, 2470 Series Enclosure, Less Plug-In Power Supply

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
[4]A51	CIRCUIT ASSEMBLY, INTERCONNECTION	8416921-001
[10]A51	CIRCUIT ASSEMBLY, INTERCONNECTION	8423921-001
[11]A51	CIRCUIT ASSEMBLY, INTERCONNECTION	8441501-001
[5]---	*EXTENSION BOARD, POWER SUPPLY	8417600-001*
‡---	‡EXTENSION BOARD, POWER SUPPLY	8417450-001‡
---	EXTENSION BOARD, SYNC AND ACCESSORY	9070330-001
C1	CAPACITOR, ELECTROLYTIC, 10 μF, 50V	0510095-008
CR1	DIODE, SILICON, TYPE 1N2094	3510028-005
CR2	DIODE, SILICON, TYPE 1N2094	3510028-005
[8]CR3	DIODE, ZENER, TYPE UZ730	3510062-004
[9]CR3	DIODE, ZENER, TYPE 1N4746	3510049-020
F1	FUSE, CARTRIDGE, 3 AG, TIME-DELAY, 1/2 AMP	1710040-014
[12]J1	CONNECTOR, BNC	1310242-001
[13]J1	CONNECTOR, UHF	1310242-002
[12]J2	CONNECTOR, BNC	1310242-001
[13]J2	CONNECTOR, UHF	1310242-002
[12]J3	CONNECTOR, BNC	1310242-001
[13]J3	CONNECTOR, UHF	1310242-002
[12]J4	CONNECTOR, BNC	1310242-001
[13]J4	CONNECTOR, UHF	1310242-002
[12]J5	CONNECTOR, BNC	1310242-001
[13]J5	CONNECTOR, UHF	1310242-002
[12]J6	CONNECTOR, BNC	1310242-001
[13]J6	CONNECTOR, UHF	1310242-002
[12]J7	CONNECTOR, BNC	1310242-001
[13]J7	CONNECTOR, UHF	1310242-002
[12]J8	CONNECTOR, BNC	1310242-001
[13]J8	CONNECTOR, UHF	1310242-002

Table 4-1. List of Replacement Parts, 2470 Series Enclosure, Less Plug-In Power Supply (Contd)

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
[12]J9	CONNECTOR, BNC	1310242-001
[13]J9	CONNECTOR, UHF	1310242-002
[12]J10	CONNECTOR, BNC	1310242-001
[13]J10	CONNECTOR, UHF	1310242-002
[1]J21	CONNECTOR, MULTICONTACT, 8-PIN, FEMALE	1310138-006
[7]J21	CONNECTOR, MULTICONTACT, 8-PIN, FEMALE	1302248
P1	PLUG AND LINE-CORD ASSEMBLY	7610071-001
[1]P21	CONNECTOR, MULTICONTACT, 8-PIN, MALE	1310138-304
[7]P21	CONNECTOR, MULTICONTACT, 8-PIN, MALE	1302269
Q1	TRANSISTOR, TYPE 40250	7210071-001
[9]Q2	TRANSISTOR, TYPE 40250V1	7210078-001
R1	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R2	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R3	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R4	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R5	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R7	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R8	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R9	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
R10	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
[8]R11	RESISTOR, 1W, 5%, 22 OHM	0310031-220
[9]R11	RESISTOR, 1/2W, 5%, 1 KILOHM	0310030-102
[1]T1	TRANSFORMER, POWER	8416924-002
[2]T1	TRANSFORMER, POWER	8423925-001
[10]T1	TRANSFORMER, POWER	8423928-001
[11]T1	TRANSFORMER, POWER	8440301-001
Δ[2]T1	TRANSFORMER, POWER, WITH MOUNTING BRACKET	8423928-002
[1]T2	TRANSFORMER, POWER	8417315-001

Table 4-1. List of Replacement Parts, 2470 Series Enclosure, Less Plug-In Power Supply (Contd)

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
TP1	CONNECTOR, TEST JACK	1310195-001
TP2	CONNECTOR, TEST JACK	1310195-001
TP3	CONNECTOR, TEST JACK	1310195-001
TP4	CONNECTOR, TEST JACK	1310195-001
TP5	CONNECTOR, TEST JACK	1310195-001
TP7	CONNECTOR, TEST JACK	1310195-001
TP8	CONNECTOR, TEST JACK	1310195-001
TP9	CONNECTOR, TEST JACK	1310195-001
TP10	CONNECTOR, TEST JACK	1310195-001

*REQUIRED FOR SERVICING, BUT NOT FURNISHED
‡REQUIRED FOR SERVICING, FURNISHED WITH UNITS 5-0311 AND ON
△PREFERRED REPLACEMENT FOR UNITS INDICATED
[1]USED IN UNITS 9-0061 THROUGH 9-0085
[2]USED IN UNITS 9-0086 THROUGH 9-0110
[3]USED IN UNITS 9-0111 THROUGH 9-0310 AND 5-0311 AND ON
[4]USED IN UNITS 9-0061 THROUGH 9-0110
[5]USED IN UNITS 9-0061 THROUGH 9-0160
[6]USED IN UNITS 9-0161 THROUGH 9-0310 AND 5-0311 AND ON
[7]USED IN UNITS 9-0086 THROUGH 9-0310 AND 5-0311 AND ON
[8]USED IN UNITS 9-0061 THROUGH 9-0210
[9]USED IN UNITS 9-0211 THROUGH 9-0310 AND 5-0311 AND ON
[10]USED IN UNITS 9-0111 THROUGH 9-0310
[11]USED IN UNITS 5-0311 AND ON
[12]USED IN 2472 SERIES UNITS
[13]USED IN 2473 SERIES UNITS

Table 4-2. List of Replacement Parts, 2470 Series Plug-In Power Supply

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
^{6}A4	CIRCUIT ASSEMBLY, POWER SUPPLY	8416951-001
^{5}A4	CIRCUIT ASSEMBLY, POWER SUPPLY	8423961-001
C1	CAPACITOR, ELECTROLYTIC, 50 μF, 50V	0510095-023
C2	CAPACITOR, ELECTROLYTIC, 50 μF, 50V	0510095-023
C3	CAPACITOR, CERAMIC, .02 μF, 1.4 KV	0410013-001
C4	CAPACITOR, CERAMIC, .02 μF, 1.4 KV	0410013-001
^{4}C5	CAPACITOR, CERAMIC, .1 μF, 50V	0410009-104
^{5}C5	CAPACITOR, MYLAR, .1 μF, 200V	0610133-019
^{6}C6	CAPACITOR, ELECTROLYTIC, 1000 μF, 15V	0510132-008
^{5}C6	CAPACITOR, ELECTROLYTIC, 1000 μF, 15V	0510124-043
C7	CAPACITOR, ELECTROLYTIC, 150 μF, 15V	0510092-024
C8	CAPACITOR, ELECTROLYTIC, 150 μF, 15V	0510092-024
C9	CAPACITOR, MYLAR, .1 μF, 200V	0610133-019
^{1}C10	CAPACITOR, MYLAR, .047 μF, 200V	0610133-015
^{2}C10	CAPACITOR, MYLAR, .1 μF, 200V	0610133-019
C11	CAPACITOR, TANTALUM, 15 μF, 25V	0510135-007
^{1}C12	CAPACITOR, MYLAR, .047 μF, 200V	0610133-015
^{2}C12	CAPACITOR, MYLAR, .1 μF, 200V	0610133-019
C13	CAPACITOR, TANTALUM, 15 μF, 25V	0510135-007
^{7}C14	CAPACITOR, CERAMIC, .1 μF, 50V	0410009-104
^{5}C14	CAPACITOR, MYLAR, .1 μF, 200V	0610133-019
^{3}C15	CAPACITOR, TANTALUM, 2.2 μF, 35V	0510135-002
^{5}C16	CAPACITOR, CERAMIC, .02 μF, 50V	0410009-203
CB1	CIRCUIT-BREAKER, 2 AMP, 120V	3810012-003
CR1	DIODE, SILICON RECTIFIER, TYPE 1N4002	3510018-010
CR2	DIODE, SILICON RECTIFIER, TYPE 1N4002	3510018-010
CR3	DIODE, ZENER, TYPE 1N4745A	3510036-039

Table 4-2. List of Replacement Parts, 2470 Series Plug-In Power Supply (Contd)

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
CR4	DIODE, SILICON, TYPE 1N2094	3510028-005
CR5	DIODE, SILICON, TYPE 1N2094	3510028-005
CR6	DIODE, SILICON, TYPE 1N2094	3510028-005
CR7	DIODE, SILICON, TYPE 1N2094	3510028-005
[6]CR8	DIODE, ZENER, TYPE RT-6	3510022-003
[5]CR8	DIODE, ZENER, TYPE 1N821	3510042-017
CR9	DIODE, ZENER, TYPE HR2.8	3510036-015
DS1	LAMP ASSEMBLY, INDICATOR, MILKY TRANSLUCENT	1710152-003
Q1	TRANSISTOR, TYPE 2N3740	7210071-003
Q2	TRANSISTOR, TYPE 40250V1	7210078-001
Q3	TRANSISTOR, TYPE 2N3905	7210072-001
Q4	TRANSISTOR, TYPE 2N3646	7210068-001
Q5	TRANSISTOR, TYPE 2N3053	7210035-028
Q6	TRANSISTOR, TYPE 2N3568	7210069-003
Q7	TRANSISTOR, TYPE 2N3646	7210068-001
Q8	TRANSISTOR, TYPE 2N3646	7210068-001
Q9	TRANSISTOR, TYPE 2N3646	7210068-001
Q10	TRANSISTOR, TYPE 2N3646	7210068-001
Q11	TRANSISTOR, TYPE 2N3646	7210068-001
[3]Q12	TRANSISTOR, TYPE 2N3646	7210068-001
[1]R1	RESISTOR, 2W, 5%, 180 OHM	0310032-181
R2	RESISTOR, 1/4W, 5%, 3.3 KILOHM	4045000-332
R3	RESISTOR, 1/4W, 5%, 10 KILOHM	4045000-103
R4	RESISTOR, 1W, 5%, 2.7 KILOHM	0310031-272
R5	RESISTOR, 1/4W, 5%, 100 KILOHM	4045000-104
R6	RESISTOR, 1/4W, 5%, 1 KILOHM	4045000-102
R7	RESISTOR, 1/4W, 5%, 220 KILOHM	4045000-224

Table 4-2. List of Replacement Parts, 2470 Series Plug-In Power Supply (Contd)

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
R8	RESISTOR, 1/4W, 5%, 150 KILOHM	4045000-154
R9	RESISTOR, 1/4W, 5%, 4.7 KILOHM	4045000-472
R10A, B, C	RESISTOR, TRIPLE UNIT VARIABLE, GANGED, .3W, 30%, 100 KILOHM, 100 KILOHM, 100 KILOHM	5010096-001
R11	RESISTOR, 1/4W, 5%, 4.7 KILOHM	4045000-472
R12	RESISTOR, 1/4W, 5%, 680 KILOHM	4045000-684
R13	RESISTOR, 1/4W, 5%, 3.3 KILOHM	4045000-332
R14	RESISTOR, 1/4W, 5%, 1 KILOHM	4045000-102
R15	RESISTOR, 1/4W, 5%, 470 OHM	4045000-471
R16	RESISTOR, 1/4W, 5%, 1 KILOHM	4045000-102
R17	RESISTOR, 1/4W, 5%, 10 OHM	4045000-100
R18	RESISTOR, 1/4W, 5%, 27 OHM	4045000-270
R19	RESISTOR, WIRE-WOUND, VARIABLE, 20%, 500 OHM	5010075-009
R20	RESISTOR, 1/4W, 5%, 2.2 KILOHM	4045000-222
R21	RESISTOR, 1/4W, 5%, 1 KILOHM	4045000-102
R22	RESISTOR, VARIABLE, 1/8W, 1 KILOHM	5010086-003
R23	RESISTOR, 1/4W, 5%, 2.7 KILOHM	4045000-272
R24	RESISTOR, 1/4W, 5%, 3.3 KILOHM	4045000-332
R25	RESISTOR, 1/4W, 5%, 680 KILOHM	4045000-684
[1]R26	RESISTOR, 1/4W, 5%, 2.2 KILOHM	4045000-222
[2]R26	RESISTOR, 1/4W, 5%, 4.7 KILOHM	4045000-472
R27	RESISTOR, 1/4W, 5%, 3.3 KILOHM	4045000-332
R28	RESISTOR, 1/4W, 5%, 2.2 KILOHM	4045000-222
R29	RESISTOR, 1/4W, 5%, 10 KILOHM	4045000-103
[2]R30	RESISTOR, 1/4W, 5%, 470 KILOHM	4045000-474
[3]R31	RESISTOR, 1/4W, 5%, 12 KILOHM	4045000-123
[3]R32	RESISTOR, 1/4W, 5%, 12 KILOHM	4045000-123

Table 4-2. List of Replacement Parts, 2470 Series Plug-In Power Supply (Contd)

CIRCUIT REF.	DESCRIPTION	COHU PART NO.
[3]R33	RESISTOR, 1/4W, 5%, 1.2 KILOHM	4045000-122
[5]R34	RESISTOR, 1W, 5%, 15 OHM	0310031-150
[5]R35	RESISTOR, 1/4W, 5%, 56 OHM	4045000-560
[5]R36	RESISTOR, 1/4W, 5%, 1 KILOHM	4045000-102
S1	SWITCH, LEVER, SPST, 3A, 125V	6110041-001

[1]ASSEMBLIES 9-0061 THROUGH 9-0085
[2]ASSEMBLIES 9-0086 THROUGH 9-0310 AND 4-0311 AND ON
[3]ASSEMBLIES 9-0111 THROUGH 9-0310 AND 4-0311 AND ON
[4]ASSEMBLIES 9-0061 THROUGH 9-0210
[5]ASSEMBLIES 9-0211 THROUGH 9-0310 AND 4-0311 AND ON
[6]ASSEMBLIES 9-0061 THROUGH 9-0210
[7]ASSEMBLIES 9-0111 THROUGH 9-0210

WARRANTY

Cohu Electronics, Inc., warrants equipment manufactured to be free from defects of material and workmanship. Any part or parts will be repaired or replaced when proven by COHU examination to have been defective within one year (90 days for batteries, fuses, transistors and tubes) from date of shipment to the original purchaser. All warranty repairs will be performed at the factory or as otherwise authorized by COHU in writing. Transportation charges shall be prepaid by purchaser.

This warranty does not extend to COHU equipment subjected to misuse, accident, neglect or improper application, nor repaired or altered by other than COHU or those authorized by COHU in writing.

This warranty is in lieu of all other warranties express or implied. COHU shall not be liable for collateral or consequential damages.

For customer convenience, service departments are maintained throughout the United States by COHU Field Engineering Representatives.

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